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(2S,4S)-3-((1R)-1-hydroxyethyl)-2-azetidinone derivs. prodn. -
comprises reducing corresp. 3-acetyl deriv. in presence of NADP
oxido-reductase

Patent Assignee: MERCIAN CORP (SAOC)

Number of Countries: 001 Number of Patents: 002

Abstract (Basic): JP 4054182 A

Prodn. of (3S, 4S)-3((1R)-1-hydroxyethyl) -2-azetidinone derivs. of
formula (I) comprises reducing (3S, 4S)-3-acetyl-2-azetidinone derivs. of
formula (II) in presence of a NADP oxidoreductase produced by Streptomyces
omiyensis; where R1 and R2 = H, lower alkyl, phenyl, benzyl or
diphenylmethyl, or together form lower alkylene; Z = H or amino-protecting
gp.

The oxidoreductase is produced by Streptomyces omiyensis W-4028
(FERM P-11210) isolated from the soil of Kumamoto Pref., Japan, which may
be incubated in a medium contg. glycerol, meat extract, polypeptone, yeast
extract, NaCl, MgSO₄.H₂O CaHPO₄, CaCO₃ (precipitate), and defoaming agent,
at 28 deg. C.

The redn. is carried out with the cells or their processed ones of
Str. omiyensis in an aq. medium (buffer soln.) at a temp. of 20-35 deg.
C, pref. 25-30 deg. C, at pH 5-9, pref. pH 6-8, for a period of 3-48 hrs..
The prod. is extracted with a solvent, e.g. toluene, Et₂O, CHCl₃, EtOAc,
BuOAc.

USE/ADVANTAGE - (I) are known as intermediates for beta-lactam
antibiotics, e.g. formimidoylthienamycin (imipenem). The invention
provides a new process for stereospecifically reducing (II) to (I) in high
purity and high yield.

In an example, a soln. of 100 mg/ml (3S,4S)-3-acetyl-4
-((1S)-2,2-dimethyl-1,3-dioxolan-4-yl)-1-(4-methoxyphenyl) -2-azetidinone
in CHCl₃ (1 ml each) was placed in a 500 ml flask (x 3) and CHCl₃ was
evapd. by blowing nitrogen gas to form thin film on the bottom of flask.
Then, the cultured broth of Str. omiyensis (250 ml each) was added and
shaken at 28 deg. C for 24 hrs. n-BuOAc (50 ml) was added and the flask
was shaken vigorously. The mixt. was centrifuged (2350 rpm, 10 mins, 10
deg. C) and the upper layer was washed with aq. NaCl, dried and evapd. to
give 900 mg residue, which was chromatographed on a silica gel column
(toluene/EtOAc=4/1) to give 333.9 mg
(3S,4S)-3-((1R)-hydroxyethyl)-4-((1S)-2,2-dimethyl
-1,3-dioxolan-4-yl)-1-(4-methoxyphenyl) -2-azetidinone.

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Title Terms: HYDROXYETHYL; AZETIDINONE; DERIVATIVE; PRODUCE; COMPRISE; REDUCE;
CORRESPOND; ACETYL; DERIVATIVE; PRESENCE; NADP; OXIDO; REDUCTASE

Derwent Class: B03

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